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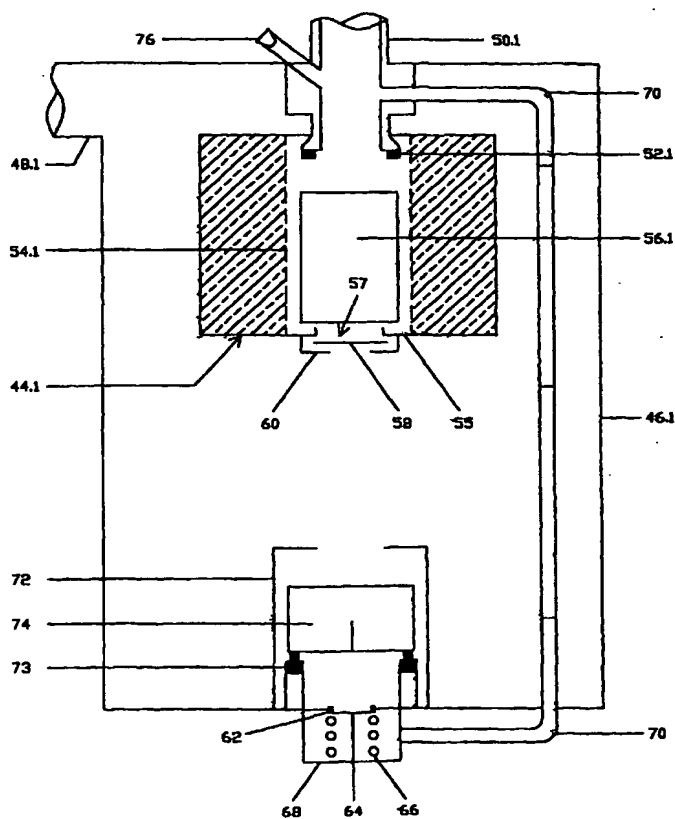
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(54) Title: FLUID FILTERS



(57) Abstract: A filter is disclosed which comprises a housing (46.1) having an inlet (48.1) and an outlet (50.1) and a filter cartridge (44.1) having a core (54.1). A float (56.1) in the core (54.1) has a buoyancy such that it sinks in the liquid product to be filtered and floats in a liquid which contaminates the liquid product. A seat (52.1) is provided at the upper end of the core (54.1) so that, as the level of contaminant liquid in the housing (46.1) increases, the float (56.1) rises in the core (54.1) and presses against the seat (52.1) to isolate the inlet (48.1) from the outlet (50.1) and thus flow through the filter is terminated. A drain outlet is provided at the lower end of the housing (46.1) and comprises a chamber (68) and a seat (62) against which a sealing element is pressed by a spring (66). The chamber (68) is connected to the outlet (50.1) by a pipe (70). Pressing of a vacuum release button (76) opens the chamber (68) to the atmosphere which creates a suction effect that overcomes the force of the spring (66) and allows the seat (64) to move downwards allowing liquid contaminant to exit the housing (46.1) via the pipe (70) and outlet (50.1).



— before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

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(88) Date of publication of the international search report:  
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# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/ZA 03/00094

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 7 B01D33/073 B01D35/147

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
IPC 7 B01D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 36 37 216 C (KRAUSE HANS) 11 May 1988 (1988-05-11) the whole document	1,2
X	----- US 3 448 858 A (MILLS PHILLIP J ET AL) 10 June 1969 (1969-06-10) column 4, line 14 - line 29 column 4, line 56 - column 5, line 2 figures	1,2
X	----- PATENT ABSTRACTS OF JAPAN vol. 018, no. 571 (C-1267), 2 November 1994 (1994-11-02) -& JP 06 210108 A (MITSUBISHI OIL CO LTD; OTHERS: 01), 2 August 1994 (1994-08-02) abstract; figures	1,3,4
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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

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Date of the actual completion of the international search

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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>-&amp; DATABASE WPI Week 199435  2 August 1994 (1994-08-02),  Derwent Publications Ltd., London, GB; AN  1994-282640  XP002261846  -&amp; JP 06 210108 A (MITSUBISHI OIL CO LTD)  2 August 1994 (1994-08-02)  abstract  -----  US 4 364 825 A (CONNOR JR AUGUSTUS S)  21 December 1982 (1982-12-21)  the whole document  -----</p>	5,7,8

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/ZA 03/00094

## Box I Observations where certain claims were found unsearchable (Continuation of Item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box II Observations where unity of invention is lacking (Continuation of Item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-5,7,8 and 14,15 as far as related to claims 1-5,7

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-5,7,8 and 14,15 as far as related to claims 1-5,7

1.1. claims: 1 and the dependent claims 2-4 and 14,15 as far as related to claims 1-4

A filter comprising:

- a housing having an inlet and an outlet,
- a filter cartridge in the housing,
- means for mounting the cartridge in the housing, and
- means for rotating the cartridge

1.2. claims: 5,8 and the dependent claims 7,14,15 as far as related to claim 5

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

A filter comprising

- a housing having an inlet and an outlet,
  - a filter cartridge having a core, a float in the core, said float having a buoyancy such that it sinks in the liquid product to be filtered and floats in a liquid which contaminates said liquid product,
  - and a seat against which the float presses when it floats upwards with an increasing level of contaminant.
- 

2. claims: 6 and its dependent claims 7,14,15 as far as related to claim 6

A filter comprising:

- a housing having an inlet and an outlet,
  - a filter cartridge in the housing,
  - means for mounting the cartridge in the housing,
  - means for rotating the cartridge ,
  - a filter cartridge having a hollow core, a float in the core, said float having a buoyancy such that it sinks in the liquid product to be filtered and floats in a liquid which contaminates said liquid product,
  - and a seat against which the float presses when it floats upwards with an increasing level of contaminant.
- 

3. claims: 9 and its dependent claims 10,11

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

A filter cartridge comprising:

- a hollow core,
- a plurality of curved vanes extending outwardly from the core, each vane having a convex leading surface and a concave trailing surface and
- filter material packed into the depressions defined by said trailing surfaces

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4. claims: 12 and its dependent claims 14,15 as far as related to claim 12

A filter comprising:

- a housing having an inlet and an outlet,
- a filter cartridge in the housing,
- a first float, a first seat, said first float lifting into contact with said first seat and closing said main outlet
- a drain outlet at the lower end of the housing,
- a valve closure element,
- a second seat, spring means for pressing said valve closure element into contact with said second seat thereby to close the drain outlet,
- a chamber,
- a connection between said chamber and the main outlet on the side of the first seat remote from said first float,
- a second float closing off said drain outlet.

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5. claims: 13 and its dependent claims 14,15 as far as related to claim 13



FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

A filter comprising:

- a housing having an inlet and an outlet,
- a filter cartridge in the housing, said cartridge having a hollow core which is open at both its upper end and its lower end and filter material sheathing the core,
- a float which sinks in the liquid product flowing through the housing but floats in liquid contaminant, said float being in said hollow core,
- a seat against which the float presses when it floats upwards with an increasing level of contaminant,
- filter material across the open lower end of the core through which liquid contaminant can flow into said core.

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/ZA 03/00094

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
DE 3637216	C	11-05-1988	DE 3637216 C1	11-05-1988
US 3448858	A	10-06-1969	NONE	
JP 06210108	A	02-08-1994	NONE	
US 4364825	A	21-12-1982	NONE	